

5 This invention generally relates to color picture tubes and, more particularly, a method and apparatus for fabricating tension masks for color picture tubes.

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A color picture tube includes an electron gun for forming and directing three electron beams to a screen of the tube. The screen is located on the inner surface of the faceplate of the tube and is made up of an array of elements of three different color emitting phosphors. An aperture mask, which may be either a domed mask or a tension mask, is interposed between the gun and the screen to permit each electron beam to strike only the phosphor elements associated with that beam. A mask is a thin sheet of metal, such as steel, that is contoured to somewhat parallel the inner surface of the tube faceplate. A focus mask comprises two sets of conductive lines that are perpendicular to each other and separated by an insulator. When different potentials are applied to the two sets of lines to create multiple focusing lenses in each of the mask openings, the mask is referred to as a focus mask. One type of focus mask is a tension focus mask, wherein at least one of the sets of conductive lines is under tension. Generally, in a tension focus mask, a vertical set of conductive lines or strands is under tension and a horizontal set of conductive lines or wires overlies the strands.

In assembling a strand tension mask, it is required to assemble the strands with a high degree of accuracy to achieve consistent spacing between the strands.

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FIG. 6 is a front view of the tension mask assembly according to the present invention; this drawing illustrates the relationship between the locations of the mask frame, the barrier ridges and the mask skirt.

DETAILED DESCRIPTION

FIG. 1 shows a cathode ray tube 10 having a glass envelope 12 comprises a rectangular faceplate panel 14 and a tubular neck 16 connected by a rectangular funnel 18. The funnel 18 has an internal conductive coating (not shown) that extends from an anode button 20 to a neck 16. The panel 14 comprises a viewing faceplate 22 and a peripheral flange or sidewall 24 that is sealed to the funnel 18 by a glass sealing frit 26. A three-color phosphor screen 28 is carried by the inner surface of the faceplate 22. The screen 28 is a line screen with the phosphor lines arranged in triads, each triad including a

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proper spatial integrity is not maintained between the individual mask strands 44 and the mask frame 300, the electron beam is caused to misregister, relative to its intended phosphor target, thus creating a visible optical anomaly on the phosphor screen 28, typically affecting color purity or causing visible streaks. It is therefore desirable to maintain parallel and uniform spacing between the mask strands 44. Commonly used mask frame 300 materials include but are not limited to steel alloys or iron-nickel alloys.

As mentioned above, the free tension mask 400 is formed of a flat thin sheet of material that has been etched to form a plurality of strands 44 between two edge portions 404. Each strand 44 is substantially parallel to the other, and each strand 44 is spaced at a precise distance apart from the other. The material of the free tension mask 400 is formed of is generally a steel or an iron nickel alloy.

Direct welding of each of mask strands 44 to the cantilevers 312A and 312B is necessary in that it allows each individual mask strand 44 to be isolated from the other mask strands 44 during tube fabrication and operation. The barrier ridges 313A and 313B to which the mask strands 44 are in frictional contact isolate each mask strand 44 from other mask strands 44 during the welding of the mask strands 44 to the cantilevers 312A and 312B.

FIG. 5 is a rear view of the tension mask 400 of FIG. 4, depicting the locations of attachment points 402A and 402B of the free tension mask 400 barrier ridges 313A and 313B of the present invention. The mask strands 44 are attached perpendicularly to the barrier ridges 313A and 313B as mentioned above. The barrier ridges are mechanical components of the mask frame 300. The barrier ridges 313A and 313B as well as the cantilevers 312A and 312B have accurate contours.

The barrier ridges 313A and 313B to which the mask strands 44 contact prevent the mask strands in the area of

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the barrier ridges 313A and 313B from losing spatial integrity in relation to each other and to the mask frame 300. The friction between mask strands 44 and barrier ridge 313A or 313B prohibits mask strands 44 from moving laterally, during the welding process of mask strands 44 to cantilever 312A or 312B, respectively. Strands 44 may be added to barrier ridges 313A and 313B using suitable adhesive such as Silicate glass for further prohibiting the lateral movement of strands 44.

FIG. 6 is a top view of the tension mask assembly 30 according to the present invention; this drawing illustrates the relationship between the locations of the mask frame 300, the barrier ridges 313A and 313B and the mask edge portions 404A and 404B. The free tension mask 400 is inserted into, and placed under tension, by a stretching fixture (not shown). The tension created by the stretching fixture maintains the spatial integrity of the mask strands 44. The tension mask 400 is then laid across and brought into contact with the mask frame 300. At this point, the locations or attachment points 402A and 402B of the free tension mask 400 contact the barrier ridges 313A and 313B.

The strands 44 are then attached to the cantilevers 312A and 312B by welding or other attachment method. The method of welding the strands 44 to the mask frame 300 is accomplished by, but not limited to, seam, resistance, spot, laser, and tack welding. After the mask strands 44 have been affixed to the cantilevers 312A and 312B, the entire mask frame assembly 30 is prepared for further processing.

As the embodiments that incorporate the teachings of the present invention have been shown and described in detail, those skilled in the art can readily devise many other varied embodiments that still incorporate these teachings without departing from the spirit of the invention.